4.3.5.4.10 *Waste Management*

This section summarizes the waste management impacts for the construction and operation of a new single unit large or small evolutionary LWR. There are no high-level or TRU wastes associated with the operation of a large or small evolutionary LWR. Tables 4.3.5.4.10–1 and 4.3.5.4.10–2 provide the estimated operational waste volumes projected to be generated at the sites analyzed as a result of a large or small evolutionary LWR. Facilities that would support the evolutionary LWR would treat and package all waste generated into forms that would enable long-term storage and/or disposal in accordance with the regulatory requirements of RCRA and other applicable statutes. Depending in part on decisions in waste-type-specific RODs for the Waste Management PEIS, wastes could be treated, and depending on the type of waste, disposed of onsite or at regionalized or centralized DOE sites. For the purposes of analyses only, this PEIS assumes that TRU and mixed TRU waste would be treated on-site to the current planning-basis WIPP WAC, and shipped to WIPP for disposal. This PEIS also assumes that LLW, mixed LLW, hazardous, and nonhazardous waste would be treated and disposed on in accordance with current site practice. The incremental waste volumes generated from the evolutionary LWR and the resultant waste effluent used for the waste impacts can be found in Section E.3.3.7. A detailed description of the waste management activities that would be required to support the evolutionary LWR can also be found in Section E.3.3.7.

Construction and operation of a large or small evolutionary LWR would impact existing waste management activities at each of the sites analyzed, increasing the generation of spent nuclear fuel, low-level, mixed, hazardous, and nonhazardous wastes. Wastes generated during construction would consist of wastewater, and solid nonhazardous and hazardous wastes. The nonhazardous waste would be disposed of as part of the construction project by the contractor and the hazardous waste would be shipped to commercial RCRA-permitted treatment and disposal facilities. No soil contaminated with hazardous or radioactive constituents is expected to be generated during construction. However, if any contaminated soil is generated it would be managed in accordance with site practice and all applicable Federal and State regulations.

A new large or small evolutionary LWR would generate 10 m^3 (13 yd^3) or 5 m^3 (6.5 yd^3) of spent nuclear fuel annually per unit, resulting in impacts associated with spent nuclear fuel management and storage. The total residual heavy metal content for the entire disposition mission is estimated to be 1,300 t (1,430 tons) for the large reactor and 1,200 t (1,320 tons) for the small reactor. NTS and Pantex do not possess existing inventories of spent nuclear fuel. These sites would need to develop the necessary storage infrastructure for safe and efficient management of spent nuclear fuel. Hanford, INEL, ORR, and SRS each possess existing inventories of spent nuclear fuel, and both INEL and SRS will receive additional spent nuclear fuel from other offsite locations. The sites with existing inventories of spent nuclear fuel may or may not have adequate existing or planned facilities that could manage the additional spent nuclear fuel until a decision regarding its ultimate disposition is made and implemented.

For the large evolutionary LWR at wet or dry sites, following treatment and volume reduction, approximately 70 m^3 (92 yd^3) per reactor of LLW from solidified liquid LLW (from primary and secondary coolant systems, spent fuel pools, and laboratory operations), protective clothing, soil, and small equipment would require disposal annually. All of the sites analyzed except Pantex have existing or planned facilities that could manage the quantities of LLW. Using the land usage factors from Section E.1.4, the area required for LLW disposal would be 0.008 ha/yr (0.02 acre/yr) for SRS, 0.01 ha/yr (0.03 acre/yr) for INEL and NTS, and 0.02 ha/yr (0.05 acre/yr) for Hanford and ORR. With no onsite LLW disposal capability, Pantex would require 5 additional LLW shipments per year to NTS. The ultimate disposal of LLW will be in accordance with the ROD(s) from the Waste Management PEIS.

For the small evolutionary LWR at wet or dry sites, following treatment and volume reduction, approximately 40 m^3 (52 yd^3) per reactor of LLW from solidified liquid LLW, protective clothing, soil, and small equipment would require disposal annually. Using the land usage factors from Section E.1.4, the area required for LLW disposal would be 0.005 ha/yr (0.01 acre/yr) for SRS, 0.006 ha/yr (0.02 acre/yr) for INEL and NTS, and

Table 4.3.5.4.10–1. Estimated Annual Generated Spent Nuclear Fuel and Waste Volumes for the Large Evolutionary Light Water Reactor[a]

		Hanford	NTS	INEL	Pantex	ORR	SRS
Category	**New Facility (m^3)**	**No Action (m^3)**	**No Action (m^3)**	**No Action (m^3)**	**No Action (m^3)**	**No Action (m^3)**	**No Action (m^3)**
Spent Nuclear Fuel	10[b]	None	None	None (offsite receipts expected)	None	None	None (offsite receipts expected)
Low-Level							
Liquid	18,900[c]	None	Dependent on restoration activities	None	1	2,970	74,000
Solid	500	3,390	15,000	7,200	19	7,320	16,400
Mixed Low-Level							
Liquid	0	3,760	None	4	<1	87,600	1,330
Solid	5	1,510	50	170	4	432	7,700
Hazardous							
Liquid	Included in solid	Included in solid	Included in solid	Included in solid	2	6,460	1,260
Solid	27	560	212	1,200	31	26	15,100
Non-hazardous (Sanitary)							
Liquid	[d]	414,000	Not reported separately, included in solid	Not reported separately, included in solid	141,000	550,000	703,000
Solid	5,280	5,107	2,120	52,000	339	53,100	61,200
Non-hazardous (Other)							
Liquid	Included in sanitary	Included in sanitary	None	None	Included in sanitary	650,000	Included in sanitary
Solid	4,430[e]	Included in sanitary	76,500	Included in sanitary	Included in sanitary	321	Included in sanitary

[a] The No Action volumes are from Tables 4.2.1.10–1, 4.2.2.10–1, 4.2.3.10–1, 4.2.4.10–1, 4.2.5.10–1, and 4.2.6.10–1. Incremental waste generation volumes for evolutionary LWR (large) are derived from Table E.3.3.7–1 and are for one reactor. Waste effluent volumes (that is, after treatment and volume reduction) that are used in the narrative description of the impacts are also provided in Table E.3.3.7–1.

[b] Spent nuclear fuel per unit. Total spent fuel for disposition mission (2 units) is 337 m^3. Residual heavy metal content in spent nuclear fuel is 38.2 t per reactor per year.

[c] Liquid LLW would be treated and solidified prior to disposal.

[d] For wet sites (Hanford, ORR, and SRS) the liquid nonhazardous waste generation is 23,900,000 m^3 and for dry sites (NTS, INEL, and Pantex) it is 342,000 m^3.

[e] Recyclable wastes.

Table 4.3.5.4.10–2. Estimated Annual Generated Spent Nuclear Fuel and Waste Volumes for the Small Evolutionary Light Water Reactor[a]

Category	New Facility (m^3)	Hanford No Action (m^3)	NTS No Action (m^3)	INEL No Action (m^3)	Pantex No Action (m^3)	ORR No Action (m^3)	SRS No Action (m^3)
Spent Nuclear Fuel	5[b]	None	None	None (offsite receipts expected)	None	None	None (offsite receipts expected)
Low-Level							
Liquid	2,990[c]	None	Dependent on restoration activities	None	8	2,970	74,000
Solid	270	3,390	15,000	7,200	32	7,320	16,400
Mixed Low-Level							
Liquid	0	3,760	None	4	4	87,600	1,330
Solid	5	1,510	50	170	46	432	7,700
Hazardous							
Liquid	Included in solid	Included in solid	Included in solid	Included in solid	2	6,460	1,260
Solid	27	560	212	1,200	31	26	15,100
Nonhazardous (sanitary)							
Liquid	[d]	414,000	Not reported separately, included in solid	Not reported separately, included in solid	141,000	550,000	703,000
Solid	3,210	5,107	2,120	52,000	339	53,100	61,200
Nonhazardous (Other)							
Liquid	Included in sanitary	Included in sanitary	None	None	Included in sanitary	650,000	Included in sanitary
Solid	2,680[e]	Included in sanitary	76,500	Included in sanitary	Included in sanitary	321	Included in sanitary

[a] The No Action volumes are from Tables 4.2.1.10–1,4.2.2.10–1, 4.2.3.10–1, 4.2.4.10–1, 4.2.5.10–1, and 4.2.6.10–1. Incremental waste generation volumes for evolutionary LWR (small) are from Table E.3.3.7–2 and are for one reactor. Waste effluent volumes (that is, after treatment and volume reduction) that are used in the narrative description of the impacts are also provided in Table E.3.3.7–2.

[b] Spent nuclear fuel per unit. Total spent fuel for disposition mission (4 units) is 338 m^3. Residual heavy metal content in spent nuclear fuel is 17.7 t per reactor per year.

[c] Liquid LLW would be treated and solidified prior to disposal.

[d] For wet sites (Hanford, ORR, and SRS) the liquid nonhazardous waste generation is 11,000,000 m^3 and for dry sites (NTS, INEL, and Pantex) it is 190,000 m^3.

[e] Recyclable wastes.

0.01 ha/yr (0.03 acre/yr) for Hanford and ORR. With no onsite LLW disposal capability, Pantex would require three additional LLW shipments per year to NTS. The ultimate disposal of LLW will be in accordance with the ROD from the Waste Management PEIS.

An estimated 5 m^3 (7 yd^3) of solid mixed LLW per reactor consisting of solvent rags and equipment that has been contaminated with both radioactive and hazardous constituents would require treatment to meet the land disposal restrictions of RCRA. Mixed LLW would be managed in accordance with the Tri-Party Agreement for Hanford and the respective site treatment plan that was developed to comply with the *Federal Facility Compliance Act* for the remainder of the sites analyzed.

Approximately 27 m^3 (35 yd^3) of hazardous waste would consist primarily of analytical solutions and solvent rags contaminated with methylene chloride, acetonitrile, and acetone. Other hazardous waste would include paint solvents, various laboratory chemicals, and organic waste from nonradioactive testing. Hazardous waste would be stored in RCRA-permitted facilities until sufficient quantity accumulated to warrant shipment to a RCRA-permitted treatment and disposal facility.

For the large evolutionary LWR (wet site), approximately 23.9 million m^3 (6.32 billion gal) of liquid nonhazardous sanitary and industrial wastewater, cooling tower blowdown, and estimated stormwater runoff per reactor would require treatment in accordance with site practice and discharge permits. Construction of sanitary, utility, and process wastewater treatment systems would be required at Hanford, ORR, or SRS. At Hanford, only cooling tower blowdown would be discharged. All other wastewater would be recycled. For the large evolutionary LWR (dry site), approximately 342,000 m^3 (90.3 million gal) of liquid nonhazardous sanitary and industrial wastewater, and estimated stormwater runoff per reactor would require treatment in accordance with site practice and discharge permits. Construction of, or major upgrades to, sanitary, utility, and process wastewater treatment systems would be required at NTS, INEL, and Pantex. After volume reduction, 1,760 m^3 (2,300 yd^3) of solid nonhazardous wastes per reactor such as paper, glass, discarded office material, and cafeteria waste that is not recycled or salvageable would be shipped to an onsite or offsite landfill in accordance with site-specific practice.

For the small evolutionary LWR (wet site), approximately 11 million m^3 (2.91 billion gal) of liquid nonhazardous sanitary and industrial wastewater, cooling tower blowdown, and estimated stormwater runoff per reactor would require treatment in accordance with site practice and discharge permits. Construction of sanitary, utility, and process wastewater treatment systems would be required at Hanford, ORR, or SRS. At Hanford, only cooling tower blowdown would be discharged. All other wastewater would be recycled. For the small evolutionary LWR (dry site), approximately 190,000 m^3 (50.2 million gal) of liquid nonhazardous sanitary and industrial wastewater, and estimated stormwater runoff per reactor would require treatment in accordance with site practice and discharge permits. Construction of, or major upgrades to, sanitary, utility, and process wastewater treatment systems would be required at NTS, INEL, and Pantex. After volume reduction, 1,070 m^3 (1,400 yd^3) of solid nonhazardous wastes per reactor such as paper, glass, discarded office material, and cafeteria waste that is not recycled or salvageable would be shipped to an onsite or offsite landfill in accordance with site-specific practice.